JOHN CANBY, 321 Arch Street, Philad'a,

Agent for

HOUGHTON'S

AUTOMATIC HOUSE PUMP

OR WATER ELEVATOR,

IS ESPECIALLY ADAPTED FOR RAISING WATER IN

Dwelling Houses, Green-Houses, Hotels,

And other places where it has been pumped by hand.

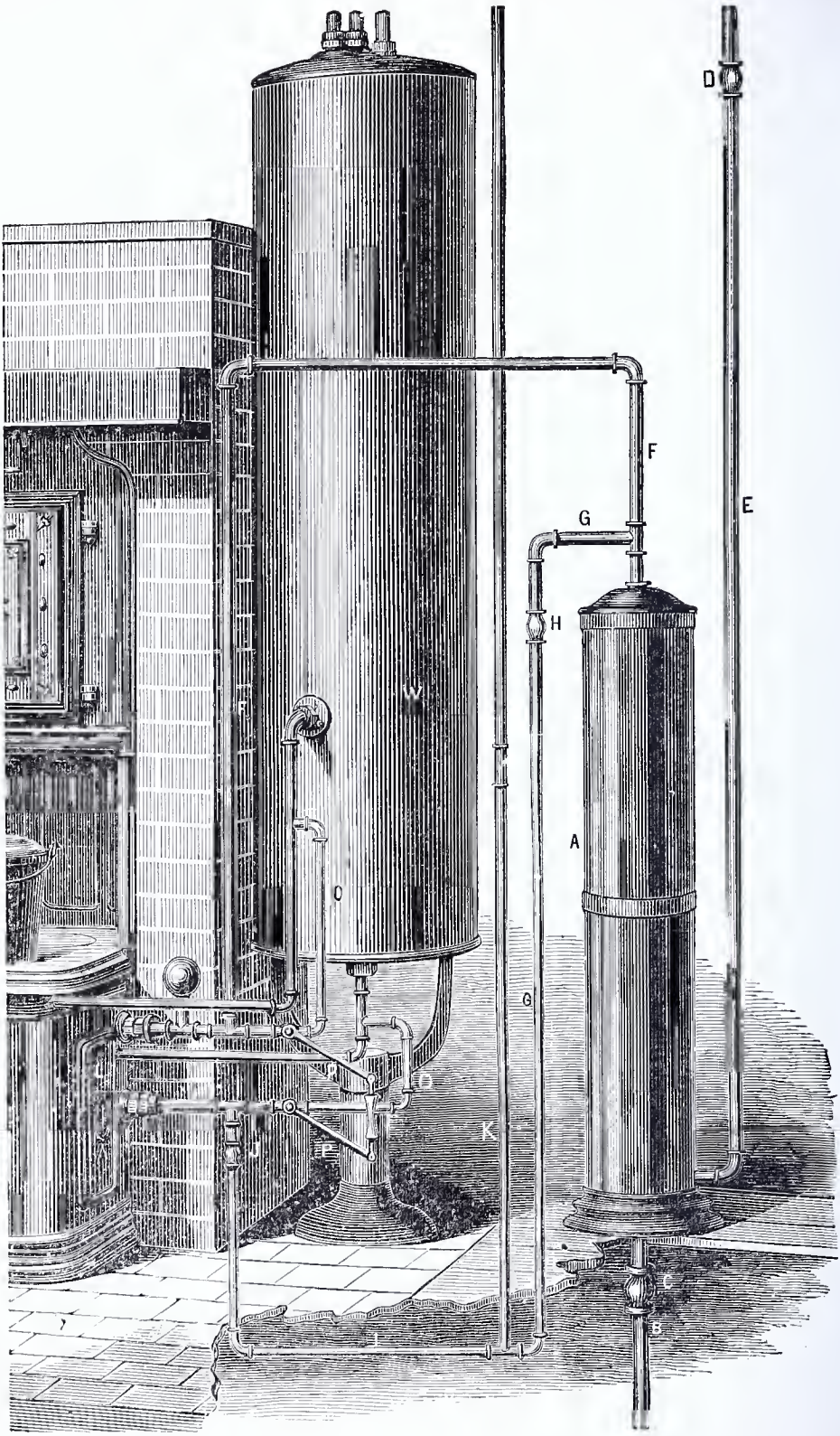
It has been thoroughly tested by constant service in many dwelling-houses: in several instances more than two years. It is operated by the surplus heat of the cooking range or stove without hindrance to its usual functions, or by a small cylinder stove prepared especially for it. It draws water from the well or cistern, within twenty-five feet perpendicular distance, (and horizontally unlimited), and forces it up to any desired height. Attached to an ordinary cooking range or stove, it will, with a good fire, draw and deliver in the tank at the top of the house about sixty gallons per hour. On a cylinder stove prepared for it, its capacity may be increased to four hundred gallons per hour.

It has no machinery or working parts subject to friction or wear, and requires no attention beyond keeping a fire, and a supply of water to draw from.

It is fully warranted as recommended.

GRANT, PRINTER, 143 WASHINGTON ST., BOSTON, MASS.

1873.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BRIEF DESCRIPTION OF

HOUGHTON'S AUTOMATIC HOUSE PUMP

OR

WATER ELEVATOR,

Patented February 7, 1871, March 5, 1872 and June 4, 1872,

by CHARLES HOUGHTON, 41 State Street, Boston.

This is a simple and durable apparatus, operated by steam generated in the ordinary fire of a cooking range or stove which is made to act directly on the water to be raised, without the intervention of machinery, forcing it to the tank at the top of the house. In the drawing annexed, the kitchen-range (L), and usual hot-water-boiler (W) are shown on the left, the pump standing at the right.

The cylinder (A) is a receptacle, alternately, for water and steam. A suction-pipe (B) from this chamber reaches to the bottom of the cistern, or well, from whence the water is to be drawn. This pipe has a valve (C), opening upwards, which prevents the water from returning to the cistern, or well. An out-let pipe (E) from the bottom of the cylinder leads to the tank to be filled, at the top of the house. This also has a valve (D), opening upwards, which prevents the return of water from above. A steam-generator, in the fire-box of the cooking range or stove is connected by a steam-pipe (F) with the top of the cylinder (A).

There is also a water supply-pipe (K), taken from the bottom of the tank at the top of the house, through which a supply of water is maintained in the steam-generator; and in this pipe is a valve (J), opening upwards, and towards the steam-generator, which prevents egress of steam or water through the pipe. A branch of this pipe (G) is entered into the top of the cylinder (A), injecting a spray of cold water to condense steam in it at the proper time. This pipe has a valve (H), which prevents the steam passing through it.

The apparatus being properly connected, as shown in the drawing, will fill with water through the pipe (K). Steam, being generated, will then pass through the pipe (F), into the cylinder (A), and expel the water therefrom up the outlet-pipe (E) to the tank at the top of the house. The steam, having expelled the water from the cylinder, will also follow, and expel it from the outlet-pipe (E). When the water has been expelled from the outlet-pipe, or, with a light pressure of steam, when it has been driven above the valve (D), the pressure of steam in the cylinder (A) will not be sufficient to sustain the column of water in the water supply-pipe (K); and water will flow through it into the Steam Generator, and replenish what has been expended in steam, and at the same time water will flow into the cylinder (A), through the pipe (G), and condense the steam there. A vacuum being produced by condensation of steam in the cylinder (A), water from the well, or cistern, flows through the inlet-pipe (B), past the valve (C), and fills the cylinder (A). The operation will be repeated as long as steam is generated.

The operation described is certain and uniform, raising with a good fire about sixty gallons of water an hour.

The economy of its use is apparent, requiring no attention or extra fuel. It will not wear out, having no working part. It is not liable to get out of order, and is not dangerous, as the presure of steam is never greater than the pressure of water in the hot-water-boiler (W). Should any greater amount of steam be generated than is needed to raise the water it escapes through a safety valve.

If a surplus of water is raised, it will be returned by a waste-pipe to the well, or cistern, or otherwise disposed of as may be desirable.

Testimonials.

NEWPORT R. I., January 16, 1873.

CHARLES HOUGHTON Esq., 41 STATE STREET, BOSTON.

Dear Sir,—It gives me pleasure to say in response to your inquiry, that since the writing of my letter of November 10, 1871, bearing testimony to the value and effieiency of your Automatic Water Elevator attaehed to the range in my house, it has been constantly in operation, raising to the tanks in the attic (a height of forty feet) an abundant supply of water for my household, consisting of twenty persons.

The Elevator is perfect in its working, and has not required the least attention.

Respectfully yours, GEO. H. NORMAN.

GRANTVILLE, MASS., Sept. 5, 1872.

Mr. CHARLES HOUGHTON, 41 State St., Boston,

DEAR SIR,—Your inquiry in regard to the working of the Automatic Water Elevator in my house is received. In answer I can truly say it is, and has been for most of the time since it was erected in my house in 1871, doing more than double the duty you recommend it for; and, excepting some injury from frost during the cold snap last winter, it has required but little attention and slight repairs. I esteem it as one of the most satisfactory house-hold helpers I have seen or heard of, and heartily recommend it to all who pump water for use in bathing tubs, wash basins, &c. Mine has not only supplied my house, occupied by some thirty persons, but also my stables with six horses and a corresponding number of vehieles.

Respectfully yours, E. LIVERMORE.

MILTON HILL, Oct. 21, 1872.

GEO. A. HAYNES, Esq., Supt.,

DEAR SIR,—The "Houghton Automatic Pump" which you erected in my house last November, has worked to my entire satisfaetion in every respect. The house has been abundantly supplied with water by it without care or labor, and it can be stopped or put in operation at pleasure. I regard it as indispensable.

Yours truly, C. C. HOLMES.

MILTON HILL, Oct. 28, 1872.

GEO. A. HAYNES, Esq.,

SIR,—The "Houghton Automatic Pump" which you put in my house works perfeetly. It requires no care, and keeps the house cistern overflowing more or less every day. It is perfectly satisfactory.

Respectfully yours, J. W. BROOKS.

36 BROMFIELD STREET, BOSTON, Nov. 27, 1871.

CHARLES HOUGHTON, Esq.,

DEAR SIR,—I have had two of your Automatic Steam Pumps in use in my houses in Auburndale. The first I used a year, and found it all you elaimed for it. It supplied a large house with all the water necessary without aid from any other source.

The second pump had a much more diffienlt task to perform. The well from which the water was taken being about twenty feet from the house and nearly thirty feet deep, and the pump was attached to a medium sized cooking-stove, and, without extra fuel, it supplied a large house with bath-rooms, wash-basins, &c , and also a barn containing four horses, a cow, and pigs, &c., with carriages and harnesses to wash, and yet furnished a full supply for all this, except a few days in the summer, when there was almost no fire in the stove.

I know of nothing which saves so much labor at a given cost as your pump; and in its operation it is simple durable, no repairs having been called for.

Yours truly, E D. WINSLOW.

Office of the "Boston Herald,"

Boston, Jan. 31, 1873.

Geo. A. Haynes, Esq., Supt.,

Dear Sir,—I have had one of Houghton's Automatic Steam Pumps in my house at Auburndale, and, after four months' trial, I can say that it gives perfect satisfaction. It pumps up enough water with our ordinary kitchen fire to supply a large house, with water-closets, bath-tub, wash hand-bowls, etc., and keeps a tank in the attic constantly full. We should consider it a serious matter now to get along without it.

Yours cordially, EDWIN B. HASKELL.

Office of Hollingsworth & Whitney,

Watertown, Mass., Dec. 28, 1872.

Mr. Geo. A. Haynes, Supt.,

Dear Sir,—Having had one of Houghton's Automatic Pumps attached to my cooking-stove for several months working to my entire satisfaction, I take this opportunity of advising you of the fact, in the hope that others wanting a good thing for raising water, may be induced to look at your pump.

Yours respectfully, L. WHITNEY, Jr.

Union Market House, Watertown, Mass., Sept. 2, 1872.

Mr. Charles Houghton, 41 State St., Boston,

Dear Sir,—In answer to your enquiry in regard to the performance of your patent Automatic Water Elevator, erected in the Union Market House early in 1871, I take pleasure in saying that it has abundantly proved itself to be all and more than you claim for it, and I heartily recommend it as a most satisfactory labor saving contrivance (for it does not seem to be a machine) to all who are now raising water for domestic uses by hand power.

Wishing you all the success you desire in introducing it, I remain,

Very respectfully yours, J. I. NESMITH, Prop'r.

No. 1 Bath Street, Boston, Nov. 29, 1871.

Charles Houghton, Esq.,

Dear Sir,—I have had the Automatic Pump in my house in Grantville the past season, and it has worked to my entire satisfaction. I have not had occasion to use my force-pump at all; and the supply of water has been abundant.

M. S. SCUDDER.

76 State Street. Boston, Nov. 8, 1871.

Charles Houghton, Esq.,

Dear Sir,—Your Automatic Steam Water Elevator, erected in my house, has now been in operation several months, and gives me perfect satisfaction in every respect.

Yours respectfully, ELLSWORTH TORREY.

94 Devonshire Street, Boston, Sept. 28, 1871.

Charles Houghton, Esq.,

Dear Sir,—In reply to your inquiry, it gives me pleasure to be able to say that your Automatic Water Elevator, erected in my house in August, 1870, has been in constant operation, and has given entire satisfaction, furnishing at all times an abundant supply of water. It requires no attention whatever. When there is a fire in the kitchen, it is always at work, quietly doing its duty. It is worthy of high commendation.

Very truly yours, EDWARD E. FLOYD.

Newport, R.I., Nov. 10, 1871.

Charles Houghton, Esq.,

Dear Sir,—In answer to your letter of the 8th inst., I would say, that I have one of your Water Elevators in my house. It was attached to the range about the first of May last; since which time it has been in operation every day, raising all the water required by a large family, and without a moment's attention being given to the apparatus.

Very respectfully, GEO. H. NORMAN.

BROOKLINE, Sept. 23, 1871.

CHARLES HOUGHTON, Esq.,

DEAR SIR,—I have had in use for some time the thing which you call a pump operated by steam from my cooking-range. I can neither call it a pump nor a machine, because either name implies a good deal of troublesome apparatus. All that I can say is, that you have established a perennial spring in the top of my house, by means of an apparatus which, so far as I can judge, is simple, safe, and satisfactory.

Yours truly, EDWARD ATKINSON.

23 MILK STREET, BOSTON, Aug. 23, 1871.

CHARLES HOUGHTON, Esq.,

DEAR SIR,—It is with feelings of great satisfaction that I inform you of the entire success of your Automatic Steam Pump in supplying my house with water. It is now about three months since I had it put into my house at Grantville, and have abundance of hot and cold water in all the rooms.

Yours most respectfully, WILLIAM HECKLE.

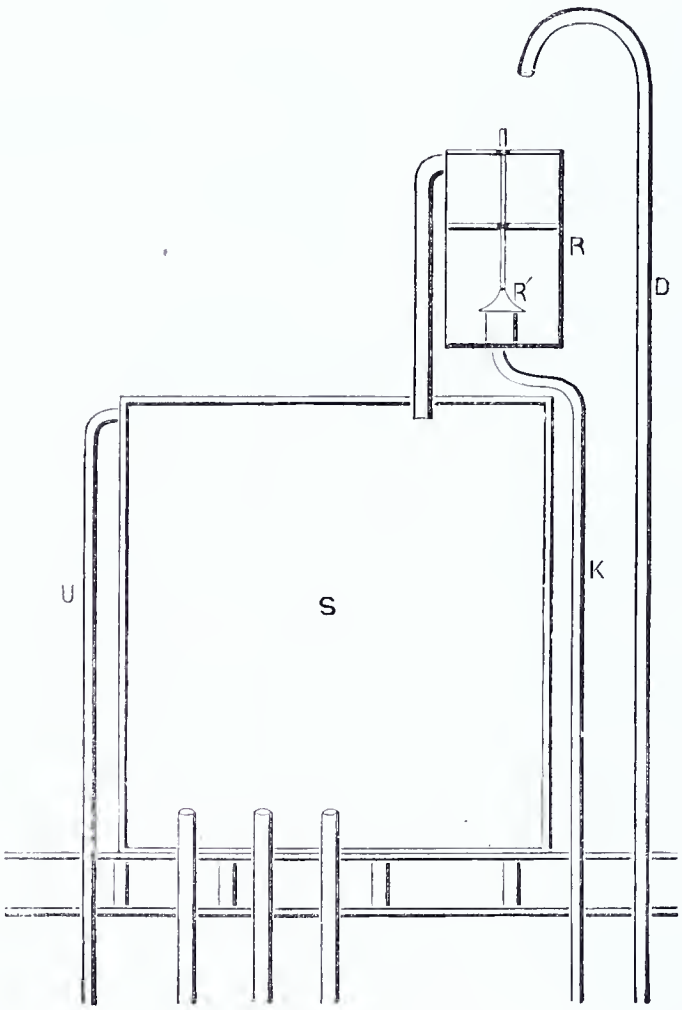

Figure 3.

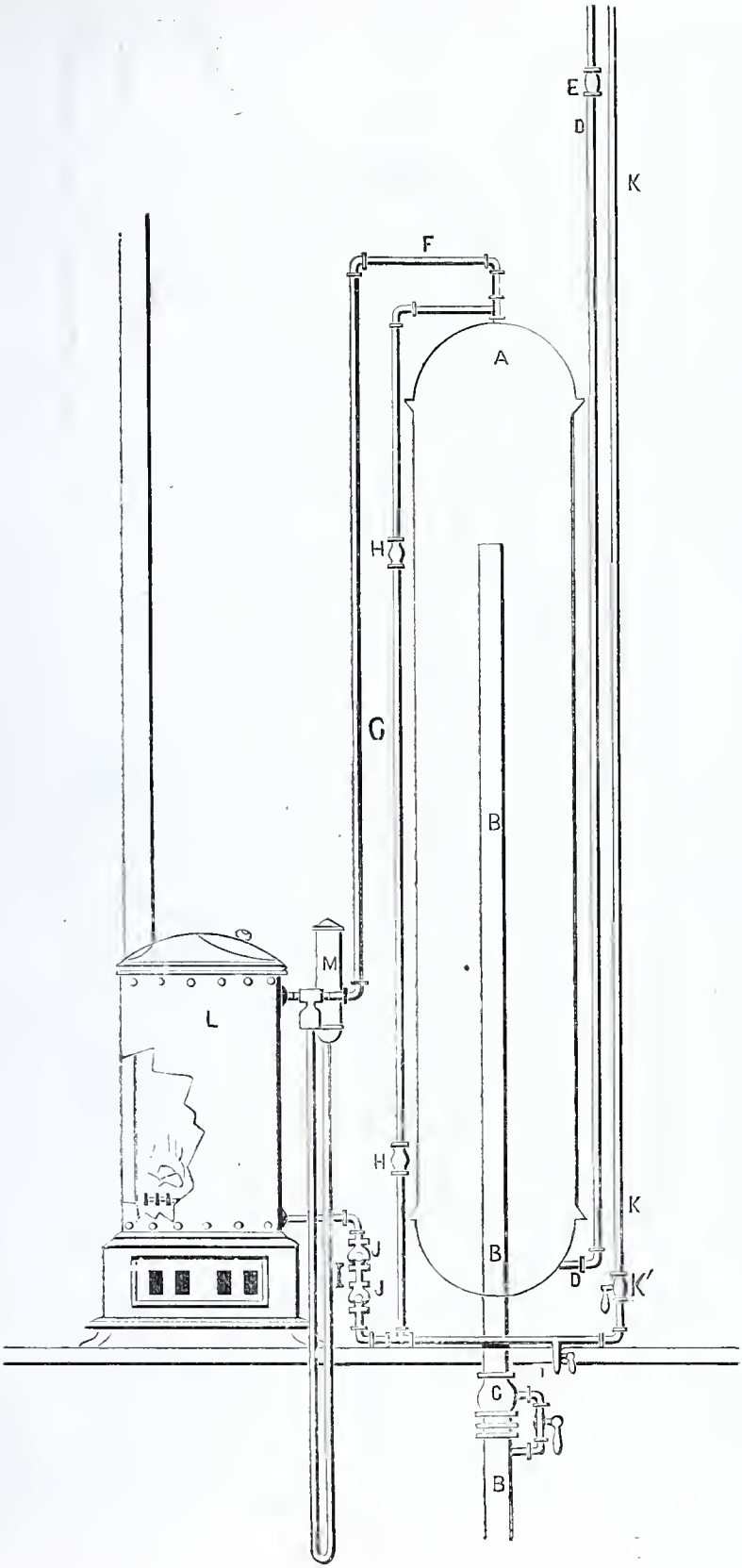

Figure 1.

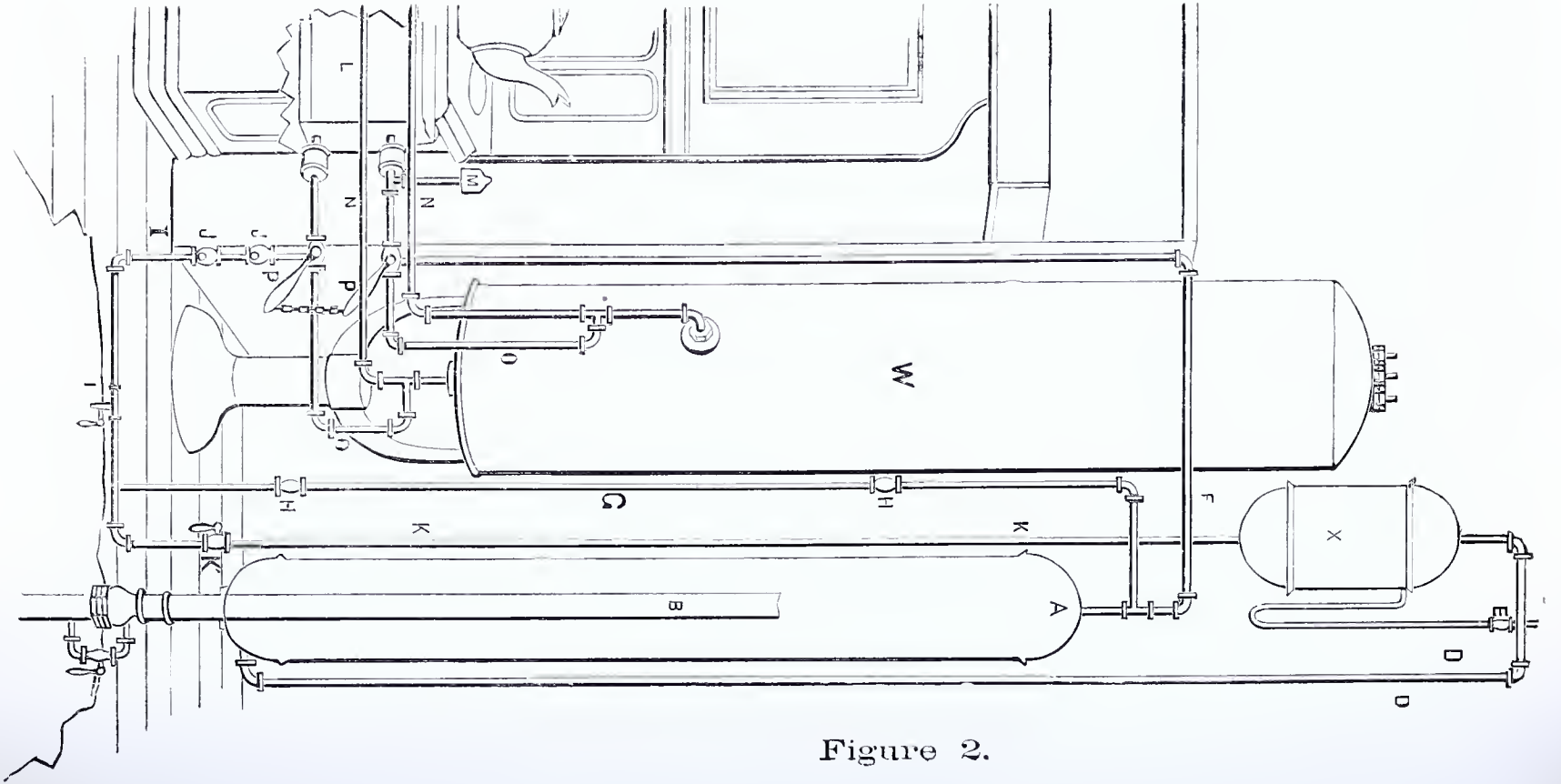

Figure 2.

SPECIFICATION.

A. In the drawing is a hollow, tight receptacle for water and steam alternately; made of suitable metal or other material, preferably in the form of an elongated cylinder, and of a size and length adapted to the amount of steam to be generated and the quantity of water to be raised. Its length should be proportioned to its diameter as about nine to one. In connection with the usual size of Cooking Range in a dwelling house, the size of this cylinder will be about six or seven inches in diameter, and about five feet long. In connection with a larger steam generator than a cooking range will contain, the cylinder may be enlarged. Its strength must be sufficient to sustain without injury the pressure of the atmosphere when a vacuum is formed in it, and several times the pressure of the column of water to be raised. The metal of which this cylinder is made should be as thin as it can be, and have strength to resist the pressure of the atmosphere when there is a vacuum in it. It may be covered with a coating or sheathing of wood or other non-conducting material with advantage. This Cylinder may be placed in a cellar below the location of the Steam Generator. When it is located on the same floor with the Steam Generator the outlet from it should be a little below the Steam Generator.

B. Is the inlet or suction pipe conducting the water to be raised from the cistern or well into the cylinder *A*, discharging it near the top. Within the cylinder it should be perforated so as not to hold water when there is none in the cylinder around it. This pipe may be carried to the top of the cylinder *A* on the outside of it. Its inside diameter should not be less than one and one-quarter inches in the size attached to a range, and a larger size, say, one and one-half to two inches is preferable.

This suction pipe must be provided with a valve *C*, a little below the bottom of the cylinder *A*, allowing water to pass upwards to the cylinder, but preventing its return. There should also be a similar valve at the lower end or foot of the suction pipe, or if not convenient to put it there it should if possible, be placed below the surface of the water. Two valves should be used in all cases in this pipe. A valve may be made with two independent gates or stoppers which will be equivalent to two valves. The gates or stoppers in these, and all the other valves used in this apparatus, except that in the outlet pipe, may be advantageously made of a vulcanized india rubber ball, of weight to sink in water quickly, and perfectly round and smooth. In all the valves used in this apparatus, a perfect stoppage of water and steam must be obtained, as any appreciable leakage would have a tendency to impede if not wholly stop the proper operation of the apparatus.

C. Is the upper valve in the inlet or suction pipe *B*. The lower valve is not shown in the drawing.

D. Is the outlet or delivery pipe, from the bottom or near the bottom of the cylinder *A*, upward to, and above the top of the tank, where the water is stored for use, discharging the water at a little distance, say two feet above the top of the tank. The size of this pipe will depend upon the size of the steam generator and its fire surface. In connection with such a generator as can be introduced into an ordinary cooking range, the inside diameter of this pipe should be one-half inch up eight or ten feet above the top of the cylinder *A*, and above that it may be larger; generally at that height it may be joined to the upward pipe of the ordinary house force pump, if it is more convenient to do so. When the cylinder steam generator hereinafter described is used, or an extended heating surface is obtained in a large range or furnace, the diameter of this outlet pipe will be proportionately increased, and should be made as large as it can be, and not

be so large but what the steam will drive the water before it up this pipe. In fact this is the rule in all cases. In connection with the cylinder generator described, this pipe may be one and a quarter inches diameter.

If this outlet pipe enters into the injection chamber hereinafter described, the same proportions will be observed, but on leaving the injection chamber near the top of the pipe, it will be carried downwards a little below the bottom of the injection chamber and then upwards.

In this outlet pipe, a little way above the top of the cylinder *A*, is placed a valve opening upwards by force of the water passing it and closing to prevent the passage of water or air downward to the cylinder *A*, or the injection chamber. Though the apparatus will work if this valve is placed higher or lower than here specified, it is better located as here described.

In case the injection chamber described is used, it would be advisable to place an additional valve between it and the cylinder *A*.

E. Is the valve in the outlet pipe *D*.

K. Is a water pipe which is taken either from the bottom of the tank at the top of the house where the water raised is stored, or the water measure hereinafter described, or from the bottom of the injection chamber. If this pipe is taken from the bottom of the storage tank, all the other pipes taking water from the tank should be raised a little above the orifice of this pipe (say two inches), so as to leave a small quantity of water always available to this pipe, which cannot be drawn off through any other.

In cases where the water is to be drawn from a deep well or cistern, say twenty feet or more and the injection chamber is not used, to obviate a tendency to take down too much water through this pipe and, consequently, too little from the well or cistern, I carry this pipe up as high as the top of the storage tank, and place upon the open upper end of it a vessel or measure which will contain enough water to supply the steam generator after each expulsion of water by steam from the cylinder *A*, and to condense the steam in the cylinder *A*. In this vessel or measure is a floating valve which will close the orifice of the pipe *K* when the water in the measure referred to has gone down, and prevent the passage of air down this pipe.

When this arrangement is used, the outlet pipe is carried higher and made to discharge into this measure and from it overflow into the storage tank. Substantially the same effect (*i. e. preventing the flow of too large a quantity of water from above when the vacuum is formed*) may be produced by a contraction or stricture in the steam and condense pipe, near where they enter the top of the cylinder *A*. This will answer equally well when the draft is not more than nineteen or twenty feet. In Fig. 3 the water storage tank *S*, water measure *R*, floating valve *R'*, overflow pipe *U*, and the upper end of outlet pipe *D* are shown.

From the tank, or injection chamber, or this measure last described, this pipe *K* is carried downwards a little way below the level of the steam generator, where it is branched in two parts, one branch *I* turning upward, is carried into the lower part of the steam generator to supply that with water, and the other branch *G* is also turned upwards and carried into the top or upper part of the cylinder *A*, or into the steam pipe just above the top of the cylinder, to inject cold water at the proper time and condense the steam in the cylinder *A*.

In the branch *I* are placed the valves *J J*, and in the branch *G* the valves *H H*, which open and permit a flow of water by them to the steam generator and cylinder *A*, when the pressure of steam in the generator is less than the weight of the column of water in the pipe *K*, and close by their own gravity when water ceases to flow by them. When steam is being generated, its first tendency is to force water up the pipe *K* instead of the outlet pipe *D*, but these valves closing tight prevent it and the only way in which water can flow and give room for the expansion of steam is up the outlet pipe *D*, and the pressure will keep these valves closed until the cylinder *A* is empty of water and the steam has driven the water out of the outlet pipe a few feet above the top of the cylinder *A*, when the pressure of water in the pipe *K* will become so much greater than the pressure of the now shorter column in the outlet pipe *D*, that it will open and flow past the valves *J J* and *H H* and refill the steam generator, and condense the steam in the cylinder *A*. The diameter of this pipe should be from one-half to three-quarters of an inch and the branches one-half inch or less; three-eighths would be better in a small apparatus. The branch *G* should be made to discharge its water into the cylinder *A* in a diffused spray.

The pipe *I may* be taken from the bottom of the hot water boiler *W*, or the pipes connecting it with coil *V V*.

K'. Is a cock in the pipe *K*.

N. Is the injection chamber mentioned. A hollow tight vessel, elongated cylindrical in form, of water capacity about one-quarter that of the cylinder *A*. Into the top of this is entered the outlet pipe *D* already described, which is again taken out a little below the point of entering and thence carried downwards a little below the bottom of the injection chamber and thence turned upward to the storage tank. From the bottom of this chamber is taken the water supply and condense pipe *K* already described. This injection chamber must be placed a short distance

above the top of the cylinder *A*, and it will contain a supply of water a little more than sufficient to replenish the steam generator after a discharge of the water in the cylinder *A*, and to condense the steam in the cylinder *A*, which it will contain after the water has been discharged from it. It is supplied with a funnel and cock at the top for convenience in filling it with water.

A little air will accumulate in the top of this chamber as well as in the top of the cylinder *A*, which is not prejudicial to the operation of the apparatus. If too much air accumulates the steam will displace and drive it out as it does the water. When steam generated has displaced all the water in the cylinder *A*, and the outlet pipe *D* from the cylinder *A* to the top of the injection chamber, the steam entering liberates the water in the chamber so that it will flow through the pipe *K* and its branches as before described. It will be perceived that when this injection chamber is used, the measuring vessel and valve at the top of the pipe *K* will not be needed.

F. Is the steam pipe leading from the generator to the top of the cylinder *A*. From a generator in a cooking range it should be one-half inch in diameter. And for a larger generator the size may be increased in proportion to the size and heating surface employed. If the injection chamber or measuring vessel at the top of the pipe *K* are neither of them used, there should be a contraction or stricture in this pipe near the top of the cylinder *A*, and also in the condense water pipe *G*.

L. Is the steam generator. In Fig. 1, it is made in the form of an upright cylinder having an outer and inner shell joined at the ends by riveting or welding, with about an inch space between them for water, the inner cylinder forming the fire pot, fitted with a grate near the bottom, and at the top a cover and funnel, the whole placed upon a base or ash box similar to the base of a common cylinder stove. It is made of boiler iron about one-quarter of an inch in thickness. It should in all cases be made so high that in generating steam to expel all the water from the cylinder *A*, not more than half to two-thirds of the water in it will be expended, and it should not be much larger. Something near this proportion is essential to the proper working of the apparatus. If the cylinder *A* is five feet long and twelve inches in diameter, it will hold about thirty gallons, and this steam generator to be in proportion to it should be about twelve inches outside and eight inches inside diameter, and twenty-six to twenty-eight inches high.

When the apparatus is to be operated from a cooking range, as shown in Fig. 2, the steam generator will be a rectangular box of wrought iron, welded or rivetted up, made just large enough to cover, sitting edgewise, with its broad side towards it, the entire back or front side of the fire pot, and of a water holding capacity before mentioned. In an ordinary sized range from four to six quarts is about the right capacity.

If made of a good quality of iron and of uniform and sufficient thickness, this steam generator may be of cast iron. It is usually placed in the range in the space allotted for the hot water back, a coil of pipe, *N*. *N*, being substituted for that, running through the fire pot in front of this steam generator.

From the upper part of the steam generator is taken the steam pipe *F*, and into the lower part of it is introduced the branch *I* of the pipe *K*, supplying it with water.

M. Is a safety valve, which should be placed on the steam generator, or if not on it, as near it as possible on the steam pipe. This may be the ordinary safety valve held down by a spring or lever weighted — or a column of mercury may be adapted to perform the office of a safety valve and an air chamber also.

For this purpose an iron tube of sufficient length is bent in the form of U, or inverted siphon, the legs being, for an ordinary size, about five feet long. At each end a bulb or cup is placed, large enough to hold the mercury which the bent tubes will contain (it being from one-quarter to one-half inch in diameter). This will be attached to the generator or steam pipe in the place of the safety valve. The loop will hang down, an aperture being made in the floor for the purpose. The bulb or cup farthest from the steam generator should be larger and deeper than the other, so that steam may escape without wasting the mercury.

The loop of iron pipe should be filled with mercury. When steam is generated it presses against the mercury with the same force it does against the water to be raised.

One foot of mercury in a column is equal to about thirteen feet of water. The pressure of steam will force the mercury down in the leg of the inverted siphon, until the difference between the length of the column of mercury in that leg and that in the other leg is equal to the column of water to be raised. If the pressure of steam should become too great for any reason (frost in the outlet pipe being almost the only cause likely to produce it), the mercury will be driven out of the siphon into the larger bulb, and steam will escape freely. When the pressure is relieved the mercury will fall back into its place in the siphon ready to perform its office as before.

When a vacuum is formed in the cylinder, then the pressure of the atmosphere will drive the mercury down in the outer leg of the siphon until the difference in length of the column of mercury in it and the other leg is equal to the pressure of the atmosphere, thus acting in relation to the cylinder and steam generator as an air chamber or cushion.

W. In the drawing shows the ordinary hot water boiler and the pipes connecting it with the coil *N N* already mentioned, by which the water in the boiler *W* is heated.

These are connected with the steam and water supply pipes from the steam generator by the pipes *O O*. At the junction of these pipes *I* and *F*, the water supply and steam pipes, are placed the three-way cocks *P P*.

The purpose of these pipes *O O*, and the cocks *P P*, is to turn the opration of the steam generator into the hot water boiler, and cut off the cylinder *A*, and stop the operation which it is sometimes desirable to do.

The coil of pipe *N N* before mentioned, serves to heat the water in the boiler *W*. This coil should be three-quarter inch diameter brass pipe for an ordinary sized house range. In a very large one inch pipe may be used. It should enter the range so as to run the length of the fire pot in front of and about opposite the middle of the steam generator, and far enough from it so that coal or ashes will not lodge between it and the steam generator. Entering and being supported by the brick work of the opposite end of the fire pot, thence bending upwards and returning close up under the top plate and near the front of the range, and thence entering the hot water boiler *W*, at the usual place.

The handles of the three-way cocks *P P* should be connected so that both may open and close together. These cocks are so made that a passage will always be open through them either to the cylinder *A* or the hot water boiler *W*, the arrangement being such that it is impossible to close both passages at the same time. These cocks will not be often used as it will be found perfectly convenient to let the apparatus work all the time when there is fire sufficient to work it, and if there is too much water raised, it will flow off through a waste pipe *U*, which in case it is desirable to save the water, can be arranged to return it to the cistern or well from which it was drawn.

There is also shown in the drawing a pipe and cock around the valve *C* for the purpose of draining the cylinder *A*, and also a pipe and cock *T* for the purpose of draining the steam generator and pipes connected.

The whole apparatus being constructed as described and made perfectly tight and strong enough to be durable is operated as follows:

It should be filled with water through the pipe *K*, or through the injection chamber if that is used. It *can* be started if only the steam generator is filled, but it is better to fill the whole apparatus.

Fire being kindled in the generator, or in the range if it is attached to one, steam is soon generated and passes along the steam pipe *F* to the top of the cylinder *A*, and expanding in the top of the cylinder forces the water it contains up the outlet pipe *D* to the storage tank above. When the pressure of steam has forced all the water out of the cylinder *A*, it will follow and drive the water before it up the pipe *D*. When it has driven the water out of the outlet pipe to the top of the injection chamber, or if the injection chamber is not used, a few — (say five or six) feet above the top of the cylinder *A*, then water will flow down the pipe *K*, through the branch *I* refilling the steam generator, and for the time stopping the generation of steam, and through the branch *G* into the cylinder *A*, entering it in a diffused spray, condensing the steam which had displaced the water in it, thereby producing a vacuum which will be immediately filled with water from the well or cistern through the suction or outlet pipe *B*, the cylinder of course being within the distance from the water to be raised, to which atmospheric pressure will raise water in a vacuum.

The fire being kept up so as to generate steam, the operation described will be repeated at short intervals indefinitely.

Muddy water would soon fill the apparatus with sediment, and stop its operation, and therefore such must not be drawn.

If it is necessary to draw water that is impure it must be filtered.

It will be perceived by mechanics that in the construction and erection of this elevator, thoroughly good and substantial workmanship in all its parts is indispensable. Properly adapted to a Cooking Range as shown in Figure 2, it will, with an ordinary fire, raise about sixty gallons per hour. As shown in Figure 1, it will, with a moderate fire, raise about three hundred gallons per hour.